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Keywords: IPAQ; muscular strength; body composition, hand-grip; key pinch; isometric strenght; university students || maria.mendes@ipb.pt

Objective

The importance of physical activity in promoting health and well-being of the young adult population is evidenced by several epidemiological studies. The increasing incidence in this population of cardiovascular, metabolic and degenerative diseases, such as obesity, has been linked with an epidemic variable, the sedentary behavior, and commonly dubbed the "disease of the century". Regular physical activity may contribute to the development of muscle strength, improve the quality of soft tissue and bone mass, and decreased body fat. The early inclusion of regular physical activity and other healthy lifestyles tend to be incorporated throughout life with noticeable gains in health and quality of life in adult life.

In this study we assessed the physical activity level (PAL), muscle strength (MS) and body composition (BC) of 84 young adults in higher education with the following objectives: assess physical activity; evaluate different manifestations of muscle strength; assess body composition and analyze the relationship between muscle strength, body composition and physical activity in young adults.

Material/Methods

We drew up a descriptive, correlational and cross-cutting study. To achieve our objective we collected the following data:

a)Physical activity: short version of IPAQ (International Physical Activity Questionnaire).
b)Muscle strength: hand grip of both hands with Jamar® Hand Dynamometer (Fig.1);
c)Key pinch strength with digital dynamometer Baseline® (Fig. 2);
d)Maximum isometric strength of the quadriceps in seat 45-degree incline leg press machine linked to a load cell Ergo Meter – Globus® and appropriated software (Fig. 3, 4, 7 and 8);
f)Body composition: bioelectric impedance on Tanita Ironman Body Composition Monitor® (Fig. 6)
g)Height: stadiometer Seca® (Fig. 5)

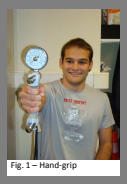
Fig. 1 – Hand-grip


Fig. 2 – Key pinch


Fig. 3 – Leg press

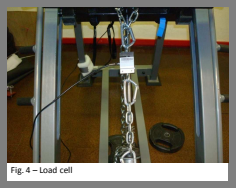
Fig. 4 – Load cell

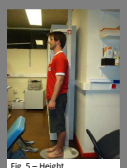
Fig. 5 – Height


Fig. 6 – Body composition

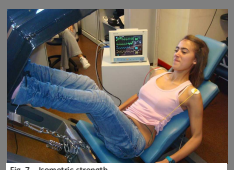
Fig. 7 – Isometric strength

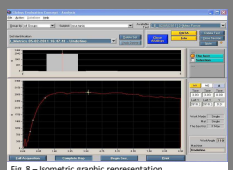
Fig. 8 – Isometric graphic representation

Results

A total of 84 university students were subject to this study, 66 females and 18 males (Table 1) with an average of 20,9±2,3 years old. In IPAQ classification we found 50 students with low, 25 with moderate and 9 with high level of physical activity (Table 2).

Relatively to muscle strength there were significant correlations between handgrip strength (both hands), key pinch strength (both hands) and isometric maximum strength of the quadriceps (Table 1).

Analyzing body composition we can observe that female students with more IMC and more body fat present higher levels of physical activity. Regarding the male students, we can find the opposite: the lesser the percentage of body fat and lower IMC levels the higher physical activity.

We found no relation between the different strength demonstrations and the levels of physical activity.

When correlating handgrip strength (right hand; left hand) with body composition, we observed correlations between:
-Height (0,704**; 0,705**), total body fat (-0,412**; -0,428**), weight (0,406**; 0,463**), body water (0,441**; 0,453**), visceral fat level (0,223*; 0,259*), bone mass (0,800**; 0,798**) and muscular mass (0,816**; 0,803**).

When correlating key pinch strength (right hand; left hand) with body composition, we observed correlations between:
-Height (0,577**; 0,531**), total body fat (-0,389**; -0,252*), weight (0,336**; 0,424**), body water (0,449**; 0,348**), bone mass (0,638**; 0,657**) and muscular mass (0,677**; 0,684**).

When correlating maximum isometric strength of the quadriceps with body composition, we observed correlations between:
- Height (0,355**), total body fat (-0,389**), body water (0,389**), bone mass (0,480**) and muscular mass (0,490**).

Table 1 - variable means by sex

	Women (N=66)	Men (N=18)	Total (N=84)
Hand-grip right hand (Kg)	27,47 ± 5,51	46,56 ± 8,90	31,56 ± 10,10
Hand-grip left hand (Kg)	25,13 ± 4,49	42,44 ± 7,26	28,84 ± 8,81
Pinch gauge right hand (Kg)	6,35 ± 1,47	10,06 ± 2,16	7,14 ± 2,23
Pinch gauge left hand (Kg)	5,98 ± 1,33	9,11 ± 2,08	6,65 ± 1,99
Maximal isometric strength of the quadriceps(N)	1798,34 ± 676,43	2793,70 ± 406,45	2007,24 ± 748,14
Total body fat(%)	27,54 ± 6,42	16,69 ± 5,77	25,42 ± 7,61
Visceral fat level	1,89 ± 1,45	2,89 ± 2,78	2,11 ± 1,84
Body water (%)	53,71 ± 4,77	63,23 ± 8,74	55,75 ± 7,00
Muscular mass(Kg)	41,95 ± 4,09	57,49 ± 6,89	45,13 ± 7,90
Bone mass (Kg)	2,25 ± 0,20	3,03 ± 0,35	2,42 ± 0,40
Body mass index (BMI)	23,49 ± 3,42	22,82 ± 3,73	23,35 ± 3,47

Table 2 - IPAQ classification

		Women	Men	Total
Low	Count	43	7	50
	% within Sex	65,2%	38,9%	59,5%
Moderate	Count	18	7	25
	% within Sex	27,3%	38,9%	29,8%
High	Count	5	4	9
	% within Sex	7,6%	22,2%	10,7%
	Count	66	18	84
	% within Sex	100%	100%	100%

Conclusion

Results indicate that the evaluated university students are mainly sedentary. We also found very strong positive correlations between the different manifestations of strength and that there is no relationship between the different manifestations of strength and levels of physical activity.

Analyzing our results, we can conjecture about why young people do exercise: females exercise themselves to lose weight and males to maintain physical condition. But there are strong correlations between the different manifestations of strength and the different variables of body composition.

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